CLAIMS

1. A microelectromechanical apparatus comprising:
a base;
a flap having a portion coupled to the base so that the flap is movable out of the plane of the base from a first angular orientation to a second angular orientation;
wherein the base has an opening that receives the flap when the flap is in the second angular orientation, the opening having one or more sidewalls, wherein at least one of the sidewalls contacts a portion of the flap such that the flap assumes an orientation substantially parallel to that of the sidewall when the flap is in the second angular orientation; and
a sidewall electrode disposed in one or more of the sidewalls.

2. The microelectromechanical apparatus of claim 1 wherein the flap further comprises a magnetically active element.

3. The microelectromechanical apparatus of claim 2 wherein the magnetically active element is a magnetic material.

4. The microelectromechanical apparatus of claim 2 wherein the magnetically active element is a coil.

5. The microelectromechanical apparatus of claim 2 further comprising an external magnet.

6. The apparatus of claim 1 wherein the flap is connected to the base by one or more flexures.

7. The apparatus of claim 7 wherein at least one flexure is electrically conductive.

8. The microelectromechanical apparatus of claim 1 further comprising a light-deflecting element disposed on the flap.

9. The microelectromechanical apparatus of claim 1, wherein the sidewall electrode is electrically isolated from the base.

10. The microelectromechanical apparatus of claim 1 further comprising:
a voltage source coupled between the flap and the sidewall electrode to apply an electrostatic force between the sidewall electrode and the flap.

11. The apparatus of claim 10 wherein the flap contains a magnetically active material and the electrostatic force between the sidewall electrode and the flap is sufficient to prevent the flap from changing position in the presence of an applied magnetic field.

12. The apparatus of claim 1 further comprising:
an electrode disposed on the base; and
a voltage source coupled between the electrode in the base and the flap to apply an electrostatic force between the electrode in the base and the flap.

13. The apparatus of claims 1 where the base is made from a substrate portion of an SOI (silicon-on-insulator) wafer and the flap is defined from a device layer portion of the SOI wafer.

14. The apparatus of claim 1 wherein the one or more flexures include one or more torsional beams.

15. The apparatus of claim 1, further comprising one or more conductive landing pads disposed on an underside of the flap wherein the one or more conductive landing pads are electrically isolated from the flap.

16. The apparatus of claim 15, wherein one or more of the conductive landing pads are electrically coupled to a sidewall electrode.

17. The apparatus of claim 15 wherein one or more of the conductive landing pads is electrically coupled to the base.

18. The apparatus of claim 1 wherein the sidewall includes a sidewall electrode and one or more conductive landing pads that are electrically isolated from the sidewall electrode.

19. The apparatus of claim 18 wherein one or more of the landing pads are electrically coupled to the flap.

20. The apparatus of claim 18 wherein the sidewall electrode is electrically isolated from the base.

21. An array of one or more structures, wherein each structure comprises:

a base;

a flap having a portion coupled to the base so that the flap is movable out of the plane of the base from a first angular orientation to a second angular orientation, the flap containing a reflecting element;

wherein the base has an opening with largely vertical sidewalls, at least one of the sidewalls containing an electrode, wherein the sidewalls contact a portion of the

flap such that the flap assumes an orientation substantially parallel to that of the sidewall when the flap is in the second angular orientation.

22. An array of claim 21 wherein one or more of the structures includes a sidewall electrode disposed in one or more of the sidewalls.

23. The array of claim 21, wherein the sidewall electrode is electrically isolated from the base.

24. An array of claim 21 wherein the array forms an optical switch.

25. An apparatus comprising:

a flap that is movable from a first angular orientation to a second angular orientation; and

a magnetic material disposed on the flap, the magnetic material having a stepped pattern.

26. A method for reducing stiction in a MEMS device having a flap that is movable with respect to a base, the method comprising:

applying a fixed force to the flap to move the flap at least partially out of contact with an underlying base.